
A Salmonellosis Outbreak in New York City Attributed to a Catering Establishment

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INVESTIGATION AND REPORTING of food-borne outbreaks have long been recognized as the basic tools of food control. Despite this, food poisoning in the United States is grossly underreported (1). If reporting in this country were on a par with that of England and Wales, the United States should have had 15,000 episodes instead of 181 recorded in 1968 (2), and a recent large *Salmonella enteritidis* outbreak in New York City need not have happened.

Salmonella has been described properly as ubiquitous. More than 1,200 serotypes have been isolated in diverse environments. They have been found in many important constituents of the American diet, in 25.7 percent of chickens, 27.2 percent of turkeys, 10.9 percent of cattle, and 10.4 percent of swine (3). The extent of food infection caused by *Salmonella* serotypes precludes prevention of their entry into food service establishments.

Although salmonellosis is primarily a disease of animals, the number of temporary human carriers may be a significant contributor to the problem. Data from 14 hospitals in New York City which examined stool specimens of prospective employees disclosed a *Salmonella*-positive rate

of 4.1 per 1,000 (4). Presumably these applicants were asymptomatic. Cherubin (5) reported that the human reservoir may be 13.8 persons per 1,000. As a symptom-causing disease, salmonellosis appears to be a greater problem nationally than in New York City. In 1969, 14.4 percent of all outbreaks were caused by salmonellae, whereas in New York City only 4.4 percent of such occurrences could be traced to these organisms (6).

The prevalence of *Salmonella* organisms is so widespread that eliminating them from our environment has been compared to the fighting of

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windmills (7). Apparently the control of salmonellosis consists of breaking the animal-to-animal, animal-to-man, and occasional man-to-man transmission routes. Until this can be accomplished, proliferation and growth of the organisms must be prevented. McCullough and Eisele (8) have demonstrated that large numbers of salmonellae are required before symptomatic illness occurs. Mishandling of food and inadequate temperatures are prerequisites in any outbreak of salmonellosis. A food processor who routinely permits these shortcomings is playing Russian roulette with *Salmonella*—sooner or later the odds are that his products will be implicated in an outbreak of foodborne illness.

The New York City Health Department recently had occasion to investigate an outbreak of salmonellosis that stemmed from a catering establishment which outwardly appeared to be a sanitary premise with a responsible management. A total of 205 persons were affected; 180 victims had eaten at a banquet prepared by the caterers, and the remainder were a partner, employees, and patrons of the establishment's restaurant.

The Investigation

The initial report that something was amiss was received by the health department on Wednesday, May 9, 1973, when a physician reported that he and others had become ill after attending a catered banquet for approximately 300 persons on the previous Sunday, May 6. The physician's illness had started at 4 pm Monday; he experienced chills, fever (102° F), and diarrhea.

Health department sanitarians went to the banquet site shortly after receiving the physician's complaint. They learned that the food—corned beef, pastrami, tongue, cole slaw, potato salad, and plain cake—had been delivered at 6:30 pm Sunday and placed directly on the tables. None of these foods had been refrigerated or heated at the banquet site, and no additional foods had been prepared on the premises. The food was consumed between 9 and 11 pm. No leftovers were available for analysis. The sanitarians obtained a list of the guests so that arrangements could be made to interview them.

The catering establishment. On the same day, the sanitarians visited the caterers who supplied the food for the banquet. Meals are served on the premises of their establishment, and they employ four foodhandlers and nine other per-

sons. When the restaurant is busy or when food is being prepared for a large affair, all the employees assist with food preparation.

Interviews with the staff disclosed that one of the owners had been ill with fever, chills, and malaise on May 2, 4 days before the banquet, and he had been treated by a physician. The physician had made no definitive diagnosis and allowed the patient to return to work. The sanitarians also learned that a dishwasher was home because he was suffering gastrointestinal illness.

Inspection of the premises revealed that many cold meats were being stored at temperatures up to 62° F, instead of the required 45° F. Examples are tongue at 60° F, rolled beef at 62° F, and stuffed derma at 50° F. Hot meats in the steamer were under the required 145° F. Also, counter-men were handling each slice of meat during slicing operations. Other violations observed included mouse, roach, and other insect infestations.

Since none of the foods prepared at the same time as those served at the banquet were available for sampling, the sanitarians took seven checkup food samples for bacterial analysis. They also gave the staff broad instructions for proper foodhandling.

On the following day, personnel from the health department's food processing unit visited the establishment. They found hot meats at temperatures of 90° and 110° F. Corned beef and pastrami were being placed directly from the refrigerator into the steamer, a slow and inefficient method of heating which allows a long time for incubation temperatures.

An important feature of foodhandling procedures that was well illustrated during this investigation is the persistence of habit. Despite their shock and concern when they learned of the outbreak and despite the instructions given them by the sanitarians the previous day, the foodhandlers were still manually handling cooked meats during preparation, storage, slicing, and serving. No attempt at sanitization was seen, and cross-contamination possibilities existed at multiple times and sites. Presumably, these same poor practices existed when the food was being prepared for the banquet.

The personnel from the health department's food processing unit learned that 48 pounds of corned beef and 48 pounds of tongue were cooked the day before the banquet. The meats were allowed to cool for an extended time at room temperature before they were refrigerated. On

the day of the banquet, the corned beef, tongue, and a precooked 20-pound piece of pastrami were sliced by machine at 11 am and placed on trays. Each slice was hand caught by the person who was doing the slicing. Several persons sliced the meats, and other persons arranged the slices on the trays, using their hands. According to the caterers, the slicing and arranging of the meats took 3 hours. However, the staff did not work exclusively on the banquet food during this time; they also attended to luncheon and other activities. Thus, the meats were allowed to remain at room temperature for 10 to 12 hours before they were consumed.

Because the establishment stores salads in large vats and uses them for the restaurant, as well as for catering, it was not possible to determine when those served at the banquet had been prepared.

The health department investigators gave the caterers detailed instructions regarding proper food preparation and handling. These instructions included the following:

1. Sanitization of all work surfaces, utensils, equipment, and slicing machines.
2. Ready-to-eat cold meats and salads to be stored at temperatures below 45° F.
3. Hot meats to be maintained at temperatures above 145° F.
4. Steam box temperature to be above 200° F before meat is placed in it.
5. Meat to be heated to an internal temperature of 145° F or higher before it is placed in the steamer.
6. Minimum handling of ready-to-eat foods with bare hands, and frequent and thorough washing of hands.
7. Refrigerated display shelf (cold plate) to be maintained at temperatures below 45° F.

Preliminary evaluation based on interviews with banquet guests and observations of foodhandling techniques at the catering establishment convinced the health department's deputy commissioner of environmental health services and his staff that continued operation of the establishment constituted a threat to the health of patrons and employees. Reports coming in of illness from patrons who had not attended the banquet reinforced this belief. Also, the potential danger precluded waiting for laboratory results for the food samples and the stool specimens taken from the foodhandlers and victims. An order to close the establishment forthwith was issued on May 11. The foodhandlers were forbidden to work in any food establishment until they were proved to be free of *Salmonella* organisms. The catering establishment was kept under daily surveillance to insure that it remained closed.

Other reported cases. News of the outbreak spread rapidly through the neighborhood of the catering establishment. Reports of illness to the health department by persons who had eaten at the restaurant included one of a woman who had eaten tongue and pastrami on May 2—the same day that one of the establishment's owners was ill—and became ill early the next morning. Twenty-one victims reported having eaten at the restaurant on May 6, the day of the banquet. Among these victims was a woman who had eaten turkey and became ill the following afternoon with symptoms that were typical of salmonellosis. She was hospitalized, and the hospital reported that her stool specimen was positive for *Salmonella* group D and she had a titer of 1:64. Another victim had eaten at the restaurant as late as May 10. Obviously, the outbreak was not confined to the catered affair.

Results of analysis of food samples taken from refrigerator of catering establishment on May 9, 1973

Food	Total plate count	Coliforms	Staphylococci ¹	Streptococci	Salmonellae
Cole slaw.....	6,300	<10	1,600	(2)	None
Potato salad.....	180,000	140	18,000	210	None
Corned beef.....	78,000	110	40,000	100	<i>S. enteritidis</i>
Pastrami.....	1,800	<10	9,500	40	<i>S. enteritidis</i>
Tongue.....	30,000	8,000	9,500	3,000	<i>S. enteritidis</i>
Corned beef.....	7,200	1,400	800	(2)	None
Tongue.....	77,000	1,400	48,000	430	None

¹ All negative. * No growth.

If reporting foodborne illness were the custom, the health department would have been notified of the first illness on May 3. Remedial measures would have been taken, and a large number of persons would have been spared from becoming ill.

Laboratory analyses of foods and water. Seven samples of foods, five meats and two salads, were taken from the restaurant for analysis by the Food Microbiological Laboratory of the health department. The findings are shown in the table. No *Clostridium perfringens* or *Shigella* organisms were recovered from any of the samples. The presence of *Salmonella* organisms in three meat samples indicated that extensive contamination existed in the restaurant; these meats were of the same types served at the banquet. The two other meat samples did not contain *Salmonella* organisms, although they presumably were prepared in the same way as the other meats. It was not possible to determine which foodhandler had prepared which food because all had participated. This disparity of results vividly illustrates the difficulties encountered in food poisoning investigations and the need for epidemiologic direction. If fewer samples had been taken, there may not have been any laboratory corroboration of the causative agent.

Ten water samples were taken at various water fixtures at the establishment. They were all satisfactory bacteriologically.

Employees, patrons, and banquet guests. Stool specimens from 12 employees and a partner were examined for enteric organisms. *S. enteritidis* was isolated from six of these persons—the partner, two kitchen helpers, two counter men, and a cook. Only the partner had been ill. No stool specimens were available from the dishwasher whose gastrointestinal symptoms began on May 7.

S. enteritidis was also recovered from six patrons. The finding of this same serotype in the foods, foodhandlers, and patrons indicated a strong cause and effect relationship.

Interviews with 230 banquet guests failed to provide a definitive clue; however, corned beef, tongue, and pastrami seemed to be implicated. Almost everyone had eaten meat and salad. The meats had been arranged so that the different types overlapped on the trays, and thus it was difficult to select only one kind. Only one person reported

not having eaten any meat; he did not become ill. The attack rate, by sex, was as follows.

Sex	Ill		Not ill	
	Number	Percent	Number	Percent
Men	92	78	25	22
Women	88	78	25	22
Total	180	78	50	22

The following symptoms were mentioned by 170 banquet victims:

Symptom	Percent with symptom
Diarrhea	93
Cramps	87
Nausea	68
Vomiting	23
Fever	64
Chills	15
Headache	6

The victims' illness lasted from 1 to 10 days, with a mean of 5.8 days. Five of these persons had been hospitalized, and *S. enteritidis* had been recovered from all of them.

There was little age difference between the ill and not ill banquet guests: the average was 61.8 years. The average age of those who were ill was 62.1 years and for those who did not become ill, it was 60.8 years. Although the guests' ages ranged from 21 months to 86 years, more than 95 percent were 60 to 63 years old.

The incubation periods of illness ranged from 6 to 41 hours. Based on interviews with 71 persons who definitely knew the time of the onset of their illness, the mean incubation period was 18 hours. The presence of gastrointestinal disorders and fever, as well as a median onset of 18 hours, is typical of salmonellosis.

Discussion and Conclusions

The illness of the partner on May 2, subsequently determined to be salmonellosis, is significant in view of the illness of a patron who had eaten at the restaurant on the same day. The partner's role in the outbreak, however, can only be conjectured. Edwards (9) stated that the presence of *Salmonella* in the foods and carcasses with which the foodhandler is in constant contact predisposes him to become an asymptomatic carrier. And, according to McCroan (10), it is impossible to distinguish between contact carrier, culprit, and victim.

S. enteritidis is being ever more commonly recovered from patients, Cherubin (11) reported that this was the most common serotype isolated in New York City in 1971. Before 1937, *S. enteri-*

tidis was not ranked among the 12 most common serotypes in man; by 1963, it was among the top 5 (12). In 1971, it was number two nationally, and it accounted for 8.8 percent of all human isolates (13). The attack rate of 78 percent in the outbreak reported here is exceptionally high.

As related earlier, the catering establishment was summarily closed on May 11. When the owners had fully complied with the rules and recommendations of the health department, they were allowed to reopen on May 26. A sanitarian was on the premises for an entire week after the reopening to insure proper foodhandling. The infected foodhandlers were allowed to return to work after they were certified by the department's Bureau of Infectious Disease Control that they were free of infectious disease. Food samples were taken from the establishment periodically, and laboratory analyses revealed that they were satisfactory.

From the information available, it appears that all the conditions which lead to outbreaks of foodborne illness were present at the restaurant for a long time; the exception was a causative agent. It was only when *Salmonella* was introduced into the environment that illness occurred. *S. enteritidis* may have been a contaminant of raw fowl that by cross contamination affected other foods, or a foodhandler may have become infected and infectious.

The illness of the 25 persons who had not attended the banquet confirms the basic deficiencies in the establishment's foodhandling procedures. Thus, it was not a one-shot incident—the large catered banquet. When the missing link—the causative pathogenic organism—was introduced, illness spread to banquet guests as well as to patrons of the restaurant.

The attack rate of 78 percent is extremely high, as mentioned earlier. Mere introduction of an organism is not sufficient to cause illness; large quantities of the organism must be ingested. For such a large attack rate, the organism needed adequate inoculation and time at incubating temperatures to reproduce.

Physicians who treat foodhandlers for symptoms indicative of salmonellosis should identify the illness and refer the worker to an appropriate health agency for surveillance. Additionally, food control agencies should place stronger emphasis on proper foodhandling. Clean walls, floors, and ceilings do not prevent foodborne illness.

According to the official records of the Food Poisoning Investigation Unit of the New York City Health Department, there were 190 reported food poisoning outbreaks with 428 victims in 1972 and 108 outbreaks with 465 victims in the first 10 months of 1973 that were attributed to food processing establishments in the city. Because of the continuing large numbers of foodborne outbreaks being traced to retail food processing establishments, as well as the lessons gained from the outbreak reported here, the health department now requires all supervisory personnel in such establishments to take a food protection course given by or acceptable to the department.

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